IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

APPEAL NO. ____________________

First named inventor: Minas H. Tanielian	Docket No. 02-0778
Serial No.10/692,039	Filed: Jan. 22, 2003
Examiner: Bernarr E. Gregory	Art Unit: 3662
Title: VIRTUALITY ATTACHED NODE	Confirm. No. 6430

APPEAL BRIEF

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1. REAL PARTY IN INTEREST

The real party in interest is the assignee, The Boeing Company.

2. RELATED APPEALS AND INTERFERENCES

No appeals or interferences are known to have a bearing on the Board's decision in the pending appeal.

3. STATUS OF CLAIMS

Claims 1-84 are pending.

Claims 1-84 are rejected.

The rejections of claims 1-84 are being appealed.

4. STATUS OF AMENDMENTS

No amendment was filed subsequent to the final office action dated 14 October 2009.

5. SUMMARY OF CLAIMED SUBJECT MATTER

Base claim 1

Base claim 1 recites a control system for a remote-controlled vehicle. One example of a remote controlled vehicle is an unmanned air vehicle or UAV (page 3, lines 11-12). A more specific example is an airborne device 100 that includes a housing 110 and rotors 120 (Figure 1; page 5, lines 25-27; and page 8, lines 11-14). Another example is a lighter-than air device (e.g., a blimp) (page 14, lines 19-20).

An embodiment of a control system is also illustrated in Figure 1. The control system comprises an electromagnetic energy receiver 130 configured to receive an electromagnetic beam 140 (Figure 1, page 6, lines 11-14). The electromagnetic energy receiver 130 includes an electromagnetic energy converter configured to convert energy received from the electromagnetic beam and generate electrical power (page 6, lines 12-14); and a beam position sensor configured to generate a control signal (page 11, lines 21-23) indicative of a position of the electromagnetic energy receiver relative to a position of the electromagnetic beam and generate a control (page 6, lines 25-26; page 7, lines 17-19; and page 15, lines 5-8).

The control system further comprises a propulsion control system configured to receive at least some of the electrical power (page 6, lines 14-15) and the control signal (page 7, lines 19-24). The propulsion control system is further configured to generate propulsion commands to direct the vehicle to the position of the electromagnetic beam (blocks 1306, 1310, 1314 and page 15, lines 19-29).

Dependent claim 3

Dependent claim 3, which depends from base claim 1 and intervening claim 2, recites that the electromagnetic energy receiver 130 includes at least one photoelectric cell configured to generate electrical power when subjected to application of electromagnetic energy (page 6, lines 26-29). The photoelectric cell includes a solar cell (page 6, line 28).

Dependent claim 4

Dependent claim 4, which depends from base claim 1, recites that the electromagnetic energy receiver 130 is configured to receive an externally-applied laser signal (page 8, lines 30-31).

Base claim 23

Base claim 23 recites a remote-controlled vehicle. An embodiment of a remote-controlled vehicle 100 is illustrated in Figure 1. The vehicle 100 includes a vehicle housing 110 (page 3, lines 25-26); an electromagnetic energy receiver 130 coupled with the housing 110 and configured to receive an electromagnetic beam 140; a propulsion control system; and a propulsion system 120 disposed in the housing 110 (page 5, lines 26-27).

The electromagnetic energy receiver 130 includes an electromagnetic energy converter configured to convert energy received from the electromagnetic beam and generate electrical power (page 6, lines 12-14); and a beam position sensor configured to generate a control signal (page 11, lines 21-23) indicative of a position of the electromagnetic energy receiver relative to a position of the electromagnetic beam and generate a control (page 6, lines 25-26; page 7, lines 17-19; and page 15, lines 5-8).

The propulsion control system is configured to receive at least some of the electrical power and the control signal and further configured to generate propulsion commands to direct the vehicle to the position of the electromagnetic beam (blocks 1306, 1310, 1314 and page 15, lines 19-29).

Dependent claim 25

Dependent claim 25, which depends from base claim 23 and intervening claim 24, recites that the electromagnetic energy receiver 130 includes at least one photoelectric cell configured to generate electrical power when subjected to application of electromagnetic energy (page 6, lines 26-29). The photoelectric cell includes a solar cell (page 6, line 28).

Dependent claim 26

Dependent claim 26, which depends from base claim 23, recites that the electromagnetic energy receiver 130 is configured to receive an externally-applied laser signal (page 8, lines 30-31).

Base claim 45

Base claim 45 recites a remote-controlled vehicle operation system. An embodiment of the system is illustrated in Figures 1 and 2. The system comprises a remote-controlled vehicle 100 (page 5, line 25) including a vehicle housing 110 (page 5, line 26) and an electromagnetic energy receiver 130 coupled with the housing and configured to receive an electromagnetic beam 140 (page 6, lines 11-12).

The electromagnetic energy receiver 130 includes an electromagnetic energy converter configured to convert energy received from the electromagnetic beam 140 and generate electrical power (page 6, lines 12-14); and a beam position sensor configured to generate a control signal (page 11, lines 21-23)

indicative of a position of the electromagnetic energy receiver 130 relative to a position of the electromagnetic beam and generate a control (page 6, lines 25-26; page 7, lines 17-19; and page 15, lines 5-8).

The remote controlled vehicle further includes a propulsion control system configured to receive at least some of the electrical power (page 6, lines 14-15) and the control signal (page 7, lines 19-24) and to generate propulsion commands to direct the vehicle to the position of the electromagnetic beam (blocks 1306, 1310, 1314 and page 15, lines 19-29).

The remote control vehicle further includes a propulsion system disposed in the housing 110. For example the propulsion system can include a plurality of rotors 120 (page 5, lines 25-27). The propulsion system is further configured to receive the propulsion commands

The system further includes an electromagnetic beam generator 210 configured to generate the electromagnetic beam (page 8, lines 24-25). For example, the beam generator 210 may generate a laser beam (page 8, lines 30-31).

<u>Dependent claim 47</u>

Dependent claim 47, which depends from base claim 45 and intervening claim 46, recites that the electromagnetic energy receiver 130 includes at least one photoelectric cell configured to generate electrical power when subjected to application of electromagnetic energy (page 6, lines 26-29). The photoelectric cell includes a solar cell (page 6, line 28).

Dependent claim 48

Dependent claim 48, which depends from base claim 45, recites that the electromagnetic energy receiver 130 is configured to receive an externally-applied laser signal (page 8, lines 30-31).

Base Claim 69

Base claim 69 recites a method for operating a remote-controlled vehicle. An embodiment of the method is illustrated in Figure 13. The method comprises receiving an electromagnetic beam (block 1304 and page 15, lines 17-18); converting the electromagnetic beam into electrical power to provide at least a portion of the power used by the remote-controlled vehicle (block 1304 and page 15, lines 17-19); determining a position to which the electromagnetic beam is directed (blocks 1306, 1310, 1314 and page 15, lines 19-29); and maneuvering the remote-controlled vehicle to align a position of the remote-controlled vehicle with the position to which the electromagnetic beam is directed (blocks 1308, 1312, 1316 and page 15, lines 8-11 and 19-29).

Dependent claim 71

Claim 71, which depends from base claim 69 and intervening claim 70, recites that the receiver includes a solar cell (page 6, lines 26-29).

Dependent claim 72

Claim 72, which depends from base claim 69, recites that receiving the electromagnetic beam includes receiving an externally-applied laser signal (page 8, lines 30-31).

6. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

The final office action makes a rejection of claims 1-84 under 35 USC §112, first paragraph, for failing to comply with the enablement requirement. The grounds for the '112 rejection will be reviewed on appeal.

The final office action also makes an objection to the specification. If the objection is being used to refuse to grant claims 1-84, than the objection is improper. According to MPEP 706.01, "The refusal to grant claims because the subject matter as claimed is considered unpatentable is called a "rejection." The term "rejected" must be applied to such claims in the examiner's action."

If the objection is not being used to refuse to grant claims 1-84, then the objection is not reviewable on appeal. According to MPEP 706.01, "the Board will not hear or decide issues pertaining to objections and formal matters which are not properly before the Board."

7. ARGUMENTS

REJECTION OF CLAIMS 1-84 UNDER 35 USC §112, FIRST PARAGRAPH, FOR FAILING TO COMPLY WITH THE ENABLEMENT REQUIREMENT

Section 4, page 3 of the final office action asserts that the examination of this application is not required to follow the MPEP. We respectfully disagree. Statutes relating to patents are interpreted by the courts, and the U.S. Patent and Trademark Office applies the judicial interpretations to the rules that govern the conduct of the patent examiners (see MPEP Introduction). Those rules are found in the MPEP.

The ‘112 rejection of claims 1-84 contains legal errors with respect to claim interpretation and the enablement requirement. In the arguments that follow, reference will be made to the MPEP and the law it cites.

Three groups of claims will stand or fall together. The first group is not limited to solar cells or receivers configured to receive an externally-applied laser signal. The second group recites solar cells. The third group recites a receiver configured to receive an externally-applied laser signal.

Claims 1-2, 5-24, 27-46, 49-70 and 73-84

Legal errors in claim interpretation

Consider claim 1. The final office action applies the enablement test to the following claim.

> 1. A control system for a remote-controlled vehicle, the control system comprising:
> an electromagnetic energy receiver configured to receive an electromagnetic beam, the electromagnetic energy receiver configured to convert energy received from the electromagnetic beam and generate electrical power.

The final office action interprets claim 1 as a single means claim. It alleges that the specification does not disclose devices for converting energy having wavelengths outside of the range of 1.06 to 1.07 microns. Page 3, section 6, of the office action alleges that "in order for this element to be enabled, it must be enabled for everything."

A single means claim is addressed by MPEP 2164.08(a). "A single means claim … is subject to an undue breadth rejection under 35 U.S.C. 112, first paragraph. In re Hyatt, 708 F.2d 712, 714-715, 218 USPQ 195, 197 (Fed. Cir. 1983) (A single means claim which covered every conceivable means for achieving the stated purpose was held nonenabling for the scope of the claim because the specification disclosed at most only those means known to the inventor.)."

However, claim 1 is not a single means claim. Claim 1 actually recites a combination of elements. The control system includes a combination of an electromagnetic energy receiver and a propulsion control system. The electromagnetic energy receiver includes a combination of an electromagnetic energy converter and a beam position sensor.

Claim 1 does not even recite means plus function language. According to MPEP 2181, a claim limitation will be presumed to invoke 35 U.S.C. §112, sixth paragraph, if it meets the following 3-prong analysis: (A) the claim limitations must use the phrase "means for" or "step for;" (B) the "means for" or "step for" must be modified by functional language; and (C) the phrase "means for" or "step for" must not be modified by sufficient structure, material, or acts for achieving the specified function. Claim 1 fails all three prongs. The final office action ignores the language that is actually recited.

MPEP 2143.03 states "All words in a claim must be considered in judging the patentability of that claim against the prior art." In re Wilson, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970). Because the final office action does not consider all words in claim 1, it commits additional legal error.

Moreover, claim 1 is not being given its broadest reasonable interpretation consistent with the specification, as required by MPEP 2111 and the Federal Circuit's *en banc* decision in Phillips v. AWH Corp., 415 F.3d 1303, 75 USPQ2d 1321 (Fed. Cir. 2005). The specification does not describe the claimed system as a novel converter for converting an electromagnetic beam into electrical power. It recites a system for controlling a remote controlled vehicle. The converter is an element of the system.

The specification does not describe the control system as including electromagnetic energy. It describes converters for converting electromagnetic energy into electrical power.

The specification does not describe converters that convert electromagnetic energy outside of its usable range. The specification describes devices that can convert electromagnetic radiation within its usable range.

Section 9, pages 4-5 of the final office action interprets electromagnetic energy to cover X-rays and gamma rays. However, the interpretation of electromagnetic energy is specious. Claim 1 does not recite electromagnetic energy as an element of the claimed system. The element it does recite is a converter that can convert electromagnetic energy. The office action does not consider the words associated with the electromagnetic energy.

Thus, claim 1 is not being given its broadest reasonable interpretation consistent with the specification. Therefore, the final office action commits additional legal error.

The final office action also commits the same legal errors in the interpretations of base claims 23, 45 and 69. It should be noted that base claim 69 is a method claim that does not recite any structure for converting an electromagnetic beam into electrical power.

Legal errors in the enablement requirement

MPEP 2164.04 states "In order to make a rejection, the examiner has the initial burden to establish a reasonable basis to question the enablement provided for the claimed invention... The language should focus on those factors, reasons, and evidence that lead the examiner to conclude that the specification fails to teach how to make and use the claimed invention without undue experimentation, or that the scope of any enablement provided to one skilled in the art is not commensurate with the scope of protection sought by the claims (citations omitted).

The office action does not allege that undue experimentation is required in order to make and use the claimed invention. To the contrary, it acknowledges

that a person skilled in the art can use solar cells to convert an EM beam into electrical energy.

Instead, the office action alleges that the scope of enablement is not commensurate with the scope of protection sought by the converter.

Claim 1 does not recite an energy converter alone. It recites a system that includes an energy converter and a propulsion control system. Moreover, the energy converter is used in combination with a beam position sensor.

MPEP 2164.08 is entitled "Enablement Commensurate in Scope With the Claims." It states

> The focus of the examination inquiry is whether everything within the scope of the claim is enabled. Accordingly, the first analytical step requires that the examiner determine exactly what subject matter is encompassed by the claims. See, e.g., AK Steel Corp. v. Sollac, 344 F.3d 1234, 1244, 68 USPQ2d 1280, 1287 (Fed. Cir. 2003)... The examiner should determine what each claim recites and what the subject matter is when the claim is considered as a whole, not when its parts are analyzed individually... The second inquiry is to determine if one skilled in the art is enabled to make and use the entire scope of the claimed invention without undue experimentation.
>
> How a teaching is set forth, by specific example or broad terminology, is not important.... Claims are not rejected as broader than the enabling disclosure under 35 U.S.C. 112 for noninclusion of limitations dealing with factors which must be presumed to be within the level of ordinary skill in the art; the claims need not recite such factors where one of ordinary skill in the art to whom the specification and claims are directed would consider them obvious.

Instead of considering the scope of the claims as a whole, the final office action isolates and analyses only the conversion to electrical power. This constitutes legal error. The inquiry is not whether the specification enables a converter that can convert all wavelengths in the electromagnetic spectrum. The inquiry is whether the specification enables a control system for a remote control

vehicle (claims 1-22), a remote control vehicle (claims 23-44), a remote-controlled vehicle operation system (claims 45-68),and a method for operating a remote-controlled vehicle (claims 69-84).

The specification provides broad teachings (it describes the functionality) of the converter. These broad teachings allow a person skilled in the art to choose a converter having a "usable" range of wavelengths. Photocells and solar cells are provided as examples of converters. A device that can convert a laser beam is also provided as an example. As for the control system, Figure 7 illustrates an embodiment of a control system.

Thus, the specification provides support for the full scope of each base claim as a whole, including the conversion of an electromagnetic beam into electrical energy (page 6, lines 25+ offer examples of photocells). The scope of enablement provided by the specification is commensurate with the scope of protection sought by claims 1-84.

MPEP 2164.08 and MPEP 2164.08(a) state

> To demand that the first to disclose shall limit his claims to what he has found will work or to materials which meet the guidelines specified for "preferred" materials in a process such as the one herein involved would not serve the constitutional purpose of promoting progress in the useful arts.

The final office action demands the claims to be limited to the conversion of wavelengths in the range of 1.06 μm to 1.07 μm (see section 9, pages 4-5). The specification provides these wavelengths as examples. The wavelengths of 1.06-1.07 μm provide certain advantages (see page 9, lines 4-5), but the specification does not limit the claims to those wavelengths. Requiring the claims to recite a wavelength of 1.06 to 1.07 constitutes additional legal error.

For these reasons, the ‘112 rejection is based on legal error. Therefore, the rejections of claims 1-2, 5-24, 27-46, 49-70 and 73-84 should be withdrawn.

Claims 3, 25, 47 and 71

Claims 3, 25, 47 and 71 recite an example of an energy converter: a solar cell. Despite reciting solar cells, claims 3, 25, 47 and 71 are rejected on the same grounds as their base claims. The '112 rejection of claims 3, 25, 47 and 71 is traversed for the reasons above, but modified as follows.

Claims 3, 25, 47 and 71 do not recite electromagnetic energy as a claim element. They recite solar cells, which convert electromagnetic energy.

Claims 3, 25, 47 and 71 do not recite single means for converting electromagnetic energy. They recite structure: solar cells.

Claims 3, 25, 47 and 71 do not recite solar cells that convert electromagnetic energy outside of their usable range. They simply recite solar cells. Electromagnetic radiation within the usable range of a solar cell will be converted to electrical power. The specification clearly states that "selection of the wavelength also should be made with respect to the photocells used in the electromagnetic energy receiver 130 so that the electromagnetic beam 140 will provide energy at a wavelength that can be efficiently converted by the photocells" (page 9, lines 1-5 of the specification).

The office action analyzes *electromagnetic energy* individually. Yet it is not even an element of the claimed subject matter.

Finally, the final office action admits that the specification is enabling for a solar cell. Section 11, page 5 of the final office action clearly states that the specification is enabling for EM wavelengths usable by solar cells.

Claims 4, 26, 48 and 72

Claims 4, 26, 48 and 72 recite an example of an energy converter: an electromagnetic energy receiver that can receive an externally-applied laser signal. Despite reciting such a receiver, claims 4, 26, 48 and 72 are rejected on the same grounds as their base claims. The ‘112 rejection of claims 4, 26, 48 and 72 is traversed for the reasons above, but modified as follows.

Claims 4, 26, 48 and 72 do not recite electromagnetic energy as a claim element. They recite an electromagnetic energy receiver that can receive an externally-applied laser signal.

Claims 4, 26, 48 and 72 do not recite electromagnetic energy receivers that convert electromagnetic energy outside of their usable range. They simply recite an electromagnetic energy receiver that convert an externally-applied laser signal. A person skilled in the art will select a receiver that can convert the laser signal into electrical energy in order for the claimed system to operate as intended. The specification clearly states that “selection of the wavelength also should be made … so that the electromagnetic beam 140 will provide energy at a wavelength that can be efficiently converted” (page 9, lines 1-5 of the specification).

The office action analyzes the *laser beam* individually. Yet it is not even an element of the claimed subject matter.

For the reasons above, the ‘112 rejection should be reversed. The Honorable Board of Patent Appeals and Interferences is respectfully requested to reverse the rejections.

Respectfully submitted,

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Date: April 22, 2010

8. CLAIMS APPENDIX

1. (Original) A control system for a remote-controlled vehicle, the control system comprising:

an electromagnetic energy receiver configured to receive an electromagnetic beam, the electromagnetic energy receiver including:

an electromagnetic energy converter configured to convert energy received from the electromagnetic beam and generate electrical power; and

a beam position sensor configured to generate a control signal indicative of a position of the electromagnetic energy receiver relative to a position of the electromagnetic beam and generate a control; and

a propulsion control system configured to receive at least some of the electrical power and the control signal and further configured to generate propulsion commands to direct the vehicle to the position of the electromagnetic beam.

2. (Original) The system of claim 1, wherein the electromagnetic energy receiver includes at least one photoelectric cell configured to generate electrical power when subjected to application of electromagnetic energy.

3. (Original) The system of claim 2, wherein the photoelectric cell includes a solar cell.

4. (Original) The system of claim 1, wherein the electromagnetic energy receiver is configured to receive an externally-applied laser signal.

5. (Original) The system of claim 1, wherein the electromagnetic energy receiver includes an electromagnetic receiving array including a plurality of electromagnetic sensors, each of the electromagnetic sensors being configured to generate a sensor output indicative of an intensity of electromagnetic energy received by the electromagnetic sensor.

6. (Original) The system of claim 5, wherein the propulsion control system is further configured to receive the sensor output of each of the electromagnetic sensors.

7. (Original) The system of claim 6, wherein the propulsion control system is further configured to generate propulsion commands directed to maneuvering the vehicle to generally equalize the sensor output of each of the electromagnetic sensors by maneuvering the remote-controlled vehicle such that the electromagnetic beam is received toward a center of the electromagnetic receiving array.

8. (Original) The system of claim 7, wherein the propulsion control system is further configured to generate propulsion commands directed to maneuvering the remote-controlled vehicle relative to the source of the electromagnetic beam

such that the remote-controlled vehicle maintains a predetermined distance from the source of the electromagnetic beam.

9. (Original) The system of claim 8, wherein the propulsion control system is further configured to receive external commands for adjusting a response to the electromagnetic beam.

10. (Previously presented) The system of claim 1, wherein the control system for a remote-controlled vehicle is configured for control of an airborne vehicle.

11. (Original) The system of claim 10, wherein the propulsion control system is further configured to maintain the airborne vehicle at a level attitude.

12. (Previously presented) The system of claim 10, wherein the propulsion control system is configured for control of at least one rotor disposed to generate lift.

13. (Original) The system of claim 12, wherein the propulsion control system is further configured to optimize a speed of the at least one rotor to optimize power consumption of the at least one rotor.

14. (Previously presented) The system of claim 12, wherein the propulsion control system is configured to control a plurality of individually controllable lift rotors, each of the individually controllable lift rotors being configured to generate a

variable quantity of thrust such that a composite thrust of the plurality of individually controllable lift rotors provides at least one of a lift and a thrust component in a direction generally perpendicular to the lift.

15. (Previously presented) The system of claim 10, wherein the propulsion control system is configured to control at least one rotor disposed to generate thrust in a direction generally perpendicular to the lift.

16. (Original) The system of claim 10, wherein the airborne vehicle includes a hovering vehicle configured to generate sufficient lift to support the airborne vehicle aloft.

17. (Original) The system of claim 10, wherein the airborne vehicle includes a lighter-than-air vehicle.

18. (Original) The system of claim 1, wherein the remote-controlled vehicle includes a land-based vehicle.

19. (Original) The system of claim 1, wherein the remote-controlled vehicle includes a water-based vehicle configured to operate at least one of on the surface or under the surface of a body of water.

20. (Original) The system of claim 1, wherein the remote-controlled vehicle includes a space-based vehicle configured to operate in at least a partial vacuum.

21. (Original) The system of claim 1, further comprising a plurality of auxiliary solar cells disposable on a surface of the remote-controlled vehicle, the plurality of auxiliary solar cells being configured to generate auxiliary electrical power from ambient light.

22. (Original) The system of claim 21, wherein the propulsion control system is further configured to generate propulsion commands to bring the remote-controlled vehicle to a controlled stop when contact with the electromagnetic beam is lost.

23. (Original) A remote-controlled vehicle comprising:

a vehicle housing;

an electromagnetic energy receiver coupled with the housing and configured to receive an electromagnetic beam, the electromagnetic energy receiver including:

an electromagnetic energy converter configured to convert energy received from the electromagnetic beam and generate electrical power; and

a beam position sensor configured to generate a control signal indicative of a position of the electromagnetic energy receiver relative to a position of the electromagnetic beam and generate a control;

a propulsion control system configured to receive at least some of the electrical power and the control signal and further configured to generate

propulsion commands to direct the vehicle to the position of the electromagnetic beam; and

a propulsion system disposed in the housing, the propulsion system being further configured to receive the propulsion commands.

24. (Original) The vehicle of claim 23, wherein the electromagnetic energy receiver includes at least one photoelectric cell configured to generate electrical power when subjected to application of electromagnetic energy.

25. (Original) The vehicle of claim 24, wherein the photoelectric cell includes a solar cell.

26. (Original) The vehicle of claim 23, wherein the electromagnetic energy receiver is configured to receive an externally-applied laser signal.

27. (Original) The vehicle of claim 23, wherein the electromagnetic energy receiver includes an electromagnetic receiving array including a plurality of electromagnetic sensors, each of the electromagnetic sensors being configured to generate a sensor output indicative of an intensity of electromagnetic energy received by the electromagnetic sensor.

28. (Original) The vehicle of claim 27, wherein the propulsion control system is further configured to receive the sensor output of each of the electromagnetic sensors.

29. (Original) The vehicle of claim 28, wherein the propulsion control system is further configured to generate propulsion commands directed to maneuvering the vehicle to generally equalize the sensor output of each of the electromagnetic sensors by maneuvering the remote-controlled vehicle such that the electromagnetic beam is received toward a center of the electromagnetic receiving array.

30. (Original) The vehicle of claim 29, wherein the propulsion control system is further configured to generate propulsion commands directed to maneuvering the remote-controlled vehicle relative to the source of the electromagnetic beam such that the remote-controlled vehicle maintains a predetermined distance from the source of the electromagnetic beam.

31. (Original) The vehicle of claim 30, wherein the propulsion control system is further configured to receive external commands for adjusting a response to the electromagnetic beam.

32. (Original) The vehicle of claim 23, wherein the remote-controlled vehicle includes an airborne vehicle.

33. (Original) The vehicle of claim 32, wherein the propulsion control system is further configured to maintain the airborne vehicle at a level attitude.

34. (Original) The vehicle of claim 32, further comprising a propulsion system including at least one rotor disposed to generate lift.

35. (Original) The vehicle of claim 34, wherein the propulsion control system is further configured to optimize a speed of the at least one rotor to optimize power consumption of the at least one rotor.

36. (Original) The vehicle of claim 34, wherein the propulsion system includes a plurality of individually controllable lift rotors, each of the individually controllable lift rotors being further configured to generate a variable quantity of thrust such that a composite thrust of the plurality of individually controllable lift rotors provides at least one of a lift and a thrust component in a direction generally perpendicular to the lift.

37. (Original) The vehicle of claim 32, wherein the propulsion system includes at least one rotor disposed to generate thrust in a direction generally perpendicular to the lift.

38. (Original) The vehicle of claim 32, wherein the airborne vehicle includes a hovering vehicle configured to generate sufficient lift to support the airborne vehicle aloft.

39. (Original) The vehicle of claim 32, wherein the airborne vehicle includes a lighter-than-air vehicle.

40. (Original) The vehicle of claim 23, wherein the remote-controlled vehicle includes a land-based vehicle.

41. (Original) The vehicle of claim 23, wherein the remote-controlled vehicle includes a water-based vehicle configured to operate at least one of on the surface or under the surface of a body of water.

42. (Original) The vehicle of claim 23, wherein the remote-controlled vehicle includes a space-based vehicle configured to operate in at least a partial vacuum.

43. (Original) The vehicle of claim 23, further comprising a plurality of auxiliary solar cells disposable on a surface of the remote-controlled vehicle, the plurality of auxiliary solar cells being configured to generate auxiliary electrical power from ambient light.

44. (Original) The vehicle of claim 43, wherein the propulsion control system is further configured to generate propulsion commands to bring the remote-controlled vehicle to a controlled stop when contact with the electromagnetic beam is lost.

45. (Original) A remote-controlled vehicle operation system comprising:

a remote-controlled vehicle including: a vehicle housing;

an electromagnetic energy receiver coupled with the housing and configured to receive an electromagnetic beam, the electromagnetic energy receiver including:

an electromagnetic energy converter configured to convert energy received from the electromagnetic beam and generate electrical power; and

a beam position sensor configured to generate a control signal indicative of a position of the electromagnetic energy receiver relative to a position of the electromagnetic beam and generate a control;

a propulsion control system configured to receive at least some of the electrical power and the control signal and further configured to generate propulsion commands to direct the vehicle to the position of the electromagnetic beam; and a propulsion system disposed in the housing, the propulsion system further configured to receive the propulsion commands; and

an electromagnetic beam generator configured to generate the electromagnetic beam.

46. (Original) The system of claim 45, wherein the electromagnetic energy receiver includes at least one photoelectric cell configured to generate electrical power when subjected to application of electromagnetic energy.

47. (Original) The system of claim 46, wherein the photoelectric cell includes a solar cell.

48. (Original) The system of claim 45, wherein the electromagnetic energy receiver is configured to receive an externally-applied laser signal.

49. (Original) The system of claim 45, wherein the electromagnetic energy receiver includes an electromagnetic receiving array including a plurality of electromagnetic sensors, each of the electromagnetic sensors being configured to generate a sensor output indicative of an intensity of electromagnetic energy received by the electromagnetic sensor.

50. (Original) The system of claim 49, wherein the propulsion control system is further configured to receive the sensor output of each of the electromagnetic sensors.

51. (Original) The system of claim 50, wherein the propulsion control system is further configured to generate propulsion commands directed to maneuvering the vehicle to generally equalize the sensor output of each of the electromagnetic sensors by maneuvering the remote-controlled vehicle such that the electromagnetic beam is received toward a center of the electromagnetic receiving array.

52. (Original) The system of claim 51, wherein the propulsion control system is further configured to generate propulsion commands directed to maneuvering the remote-controlled vehicle relative to the source of the electromagnetic beam such that the remote-controlled vehicle maintains a predetermined distance from the source of the electromagnetic beam.

53. (Original) The system of claim 52, wherein the propulsion control system is further configured to receive external commands for adjusting a response to the electromagnetic beam.

54. (Original) The system of claim 45, wherein the remote-controlled vehicle includes an airborne vehicle.

55. (Original) The system of claim 54, wherein the propulsion control system is further configured to maintain the airborne vehicle at a level attitude.

56. (Original) The system of claim 54, further comprising a propulsion system including at least one rotor disposed to generate lift.

57. (Original) The system of claim 56, wherein the propulsion control system is further configured to optimize a speed of the at least one rotor to optimize power consumption of the at least one rotor.

58. (Original) The system of claim 56, wherein the propulsion system includes a plurality of individually controllable lift rotors, each of the individually

controllable lift rotors being further configured to generate a variable quantity of thrust such that a composite thrust of the plurality of individually controllable lift rotors provides at least one of a lift and a thrust component in a direction generally perpendicular to the lift.

59. (Original) The system of claim 54, wherein the propulsion system includes at least one rotor disposed to generate thrust in a direction generally perpendicular to the lift.

60. (Original) The system of claim 54, wherein the airborne vehicle includes a hovering vehicle configured to generate sufficient lift to support the airborne vehicle aloft.

61. (Original) The system of claim 54, wherein the airborne vehicle includes a lighter-than-air vehicle.

62. (Original) The system of claim 45, wherein the remote-controlled vehicle includes a land-based vehicle.

63. (Original) The system of claim 45, wherein the remote-controlled vehicle includes a water-based vehicle configured to operate at least one of on the surface or under the surface of a body of water.

64. (Original) The system of claim 45, wherein the remote-controlled vehicle includes a space-based vehicle configured to operate in at least a partial vacuum.

65. (Original) The system of claim 45, further comprising a plurality of auxiliary solar cells disposable on a surface of the remote-controlled vehicle, the plurality of auxiliary solar cells being configured to generate auxiliary electrical power from ambient light.

66. (Original) The system of claim 65, wherein the propulsion control system is further configured to generate propulsion commands to bring the remote-controlled vehicle to a controlled stop when contact with the electromagnetic beam is lost.

67. (Original) The system of claim 45, wherein the electromagnetic beam generator is a laser generator.

68. (Original) The system of claim 67, wherein the laser generator generates a laser beam having a wavelength of approximately 1.064 μm.

69. (Original) A method for operating a remote-controlled vehicle, the method comprising:

receiving an electromagnetic beam;

converting the electromagnetic beam into electrical power to provide at least a portion of the power used by the remote-controlled vehicle;

determining a position to which the electromagnetic beam is directed; and

maneuvering the remote-controlled vehicle to align a position of the remote-controlled vehicle with the position to which the electromagnetic beam is directed.

70. (Original) The method of claim 69, wherein the electromagnetic beam is received using at least one photoelectric cell configured to generate electrical power when subjected to application of electromagnetic energy.

71. (Original) The method of claim 70, wherein the photoelectric cell includes a solar cell.

72. (Original) The method of claim 71, wherein receiving the electromagnetic beam includes receiving an externally-applied laser signal.

73. (Original) The method of claim 69, wherein the remote-controlled vehicle is maneuvered to follow the electromagnetic beam using a plurality of electromagnetic sensors, each of the electromagnetic sensors generating a sensor output indicative of an intensity of electromagnetic energy received by the electromagnetic sensor from the electromagnetic beam.

74. (Original) The method of claim 73, further comprising maneuvering the remote-controlled vehicle to generally equalize the sensor output of each of the electromagnetic sensors such that the electromagnetic beam is received generally evenly by the electromagnetic sensors.

75. (Original) The method of claim 73, further comprising maneuvering the remote-controlled vehicle relative to the source of the electromagnetic beam such that the remote-controlled vehicle maintains a predetermined distance from the source of the electromagnetic beam.

76. (Original) The method of claim 73, further comprising receiving external commands to adjust a response of the remote-controlled vehicle to the electromagnetic beam.

77. (Original) The method of claim 69, wherein the remote-controlled vehicle includes an airborne vehicle.

78. (Original) The method of claim 77, wherein the airborne vehicle includes a hovering vehicle configured to generate sufficient lift to support the airborne vehicle aloft.

79. (Original) The method of claim 77, further comprising optimizing a speed of the at least one rotor to optimize power consumption of the at least one rotor.

80. (Original) The system of claim 77, wherein the airborne vehicle includes a lighter-than-air vehicle.

81. (Original) The method of claim 69, wherein the remote-controlled vehicle includes a land-based vehicle.

82. (Original) The method of claim 69, wherein the remote-controlled vehicle includes a land-based vehicle.

83. (Original) The method of claim 69, wherein the remote-controlled vehicle includes a water-based vehicle configured to operate at least one of on the surface and under the surface of a body of water.

84. (Original) The system of claim 69, wherein the remote-controlled vehicle includes a space-based vehicle configured to operate in at least a partial vacuum.

9. EVIDENCE APPENDIX

None

10. RELATED PROCEEDINGS APPENDIX

None